D. C. SMITH.

WIRE FENCE MACHINE.

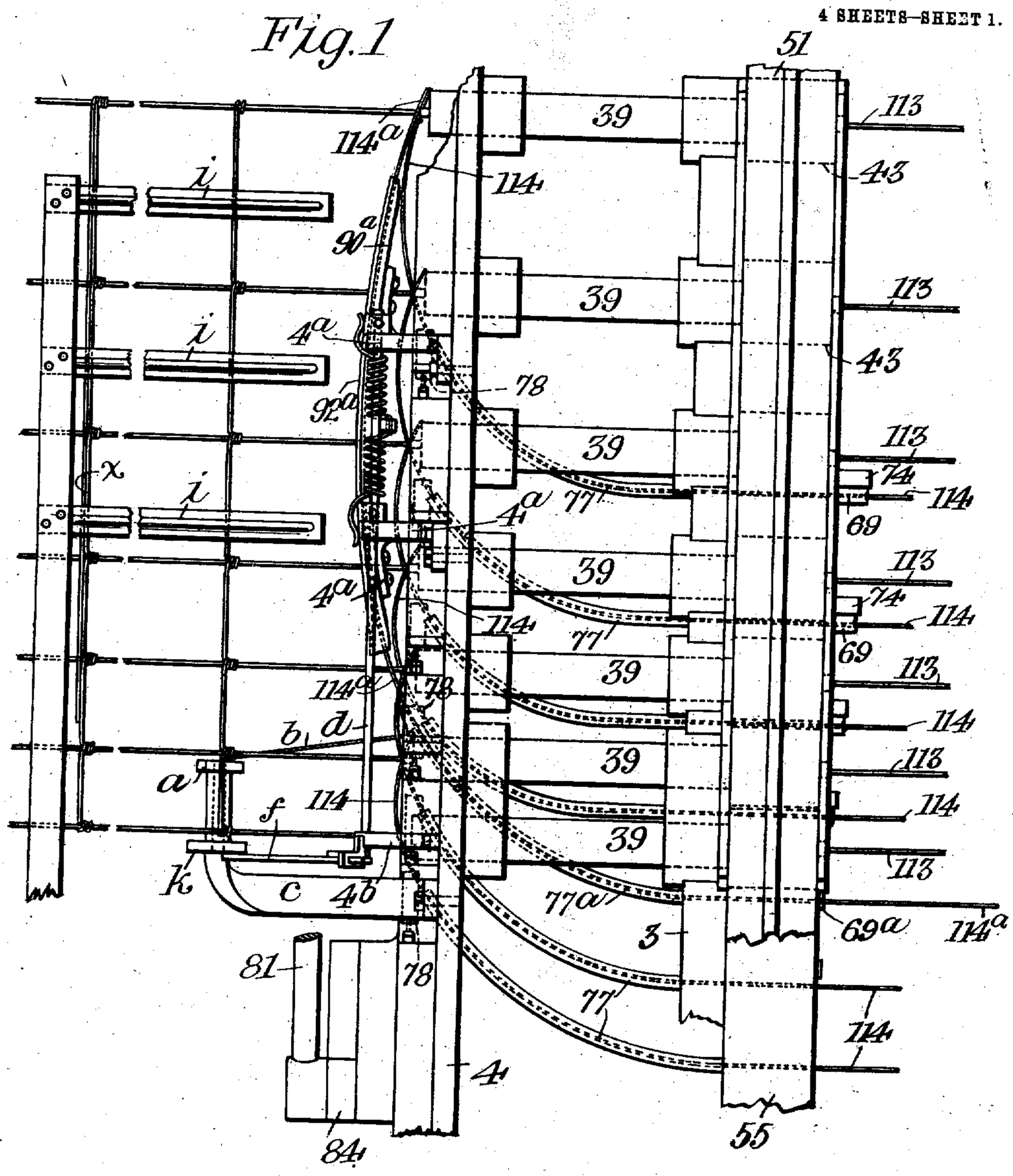
APPLICATION FILED OCT. 30, 1908.

989,199.

Patented Apr. 11, 1911.

4 SHEETS—SHEET 1.

Fig. 1



Witnesses

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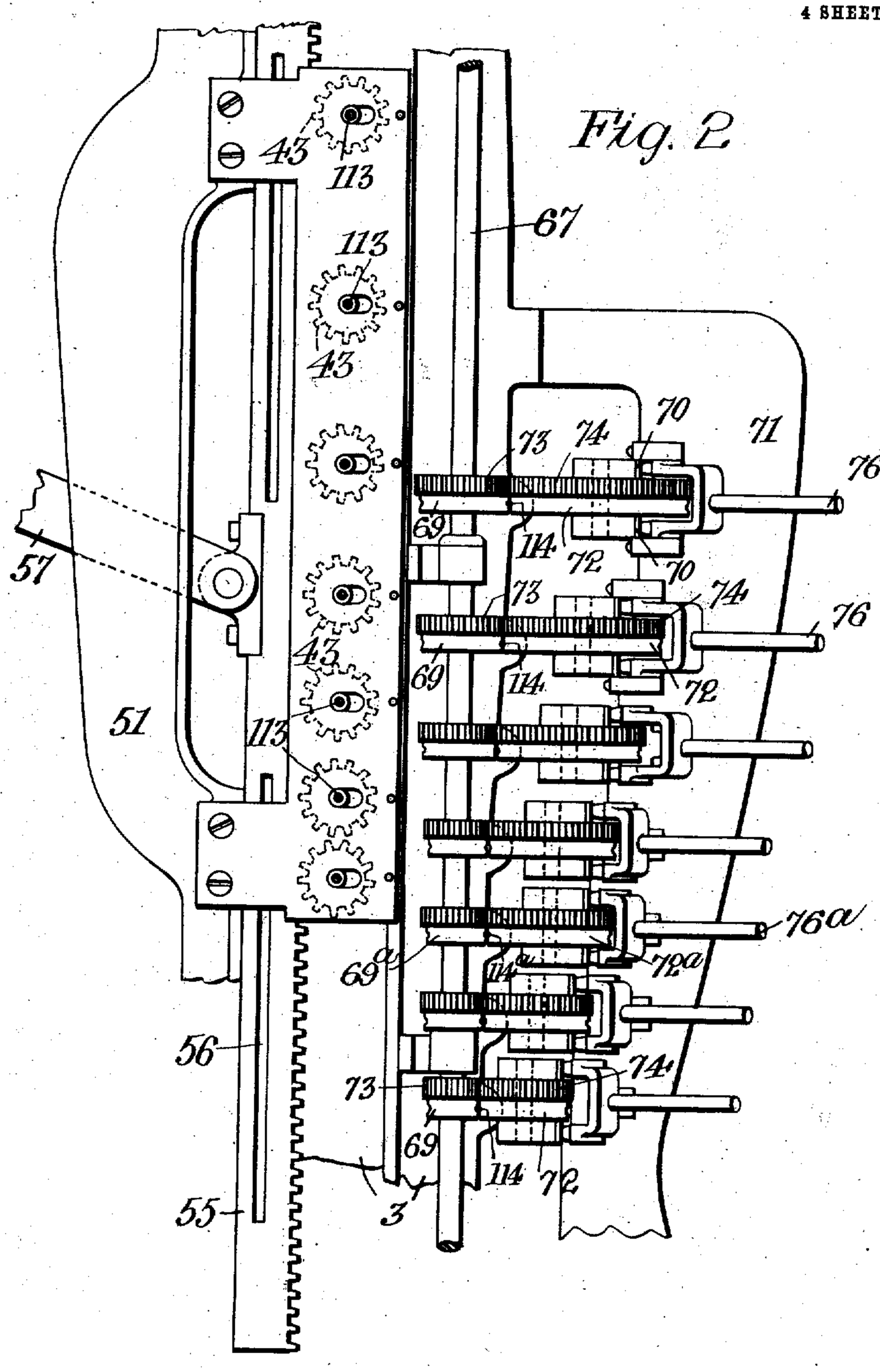
4 SHEETS—SHEET 2.

Fig. 2.



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4 SHEETS—SHEET 3.

Fig. 3

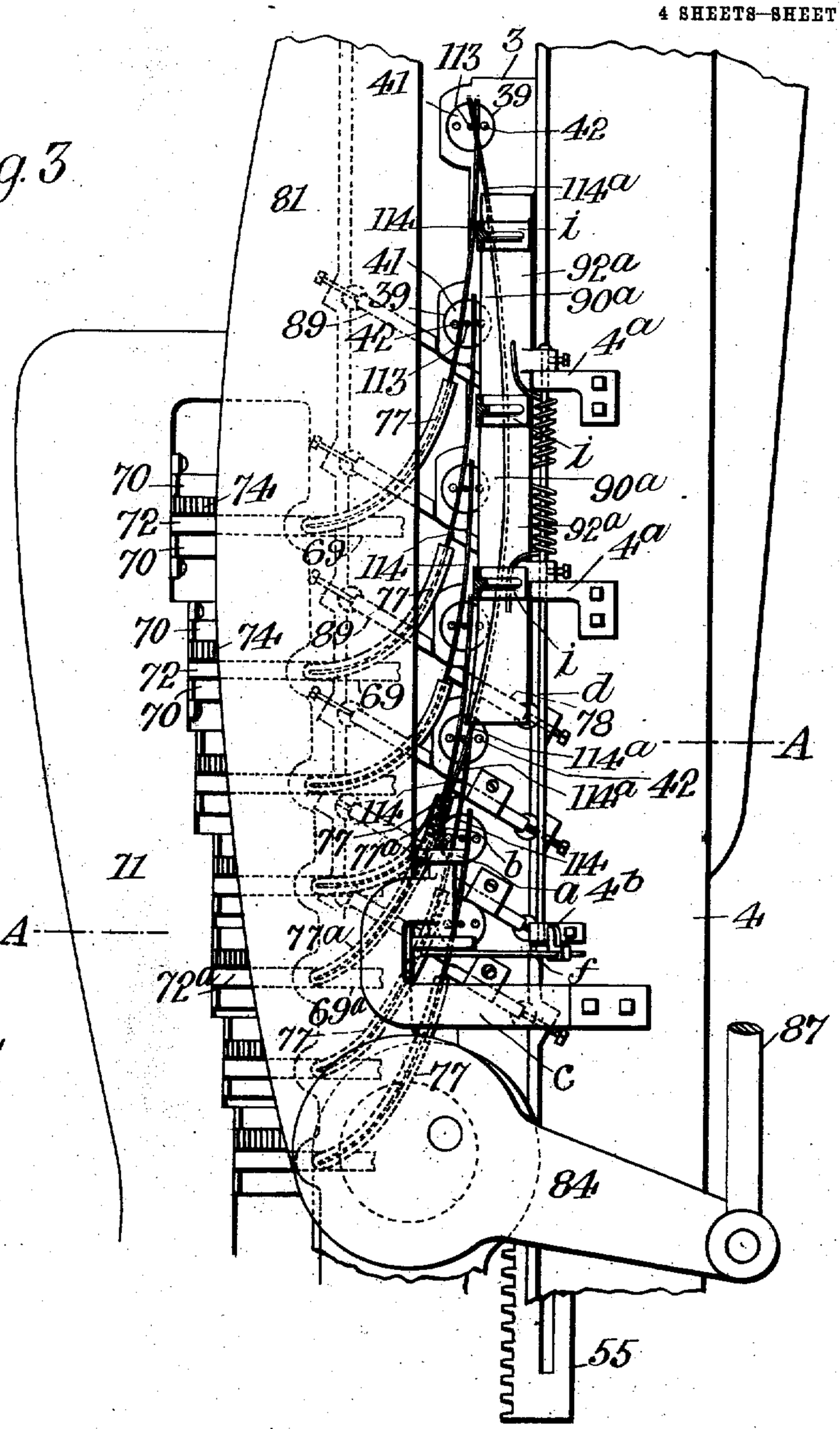
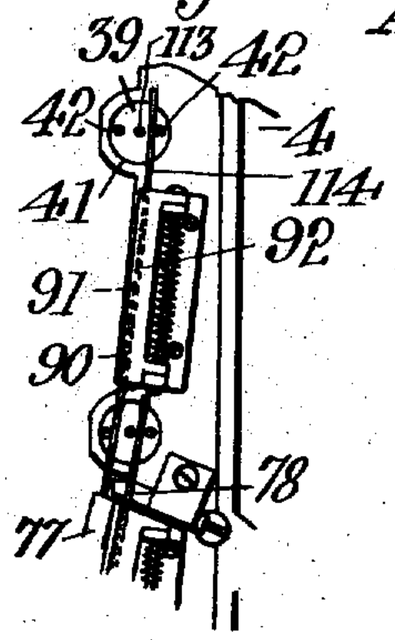


Fig. 4



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4 SHEETS—SHEET 4.

Fig. 5

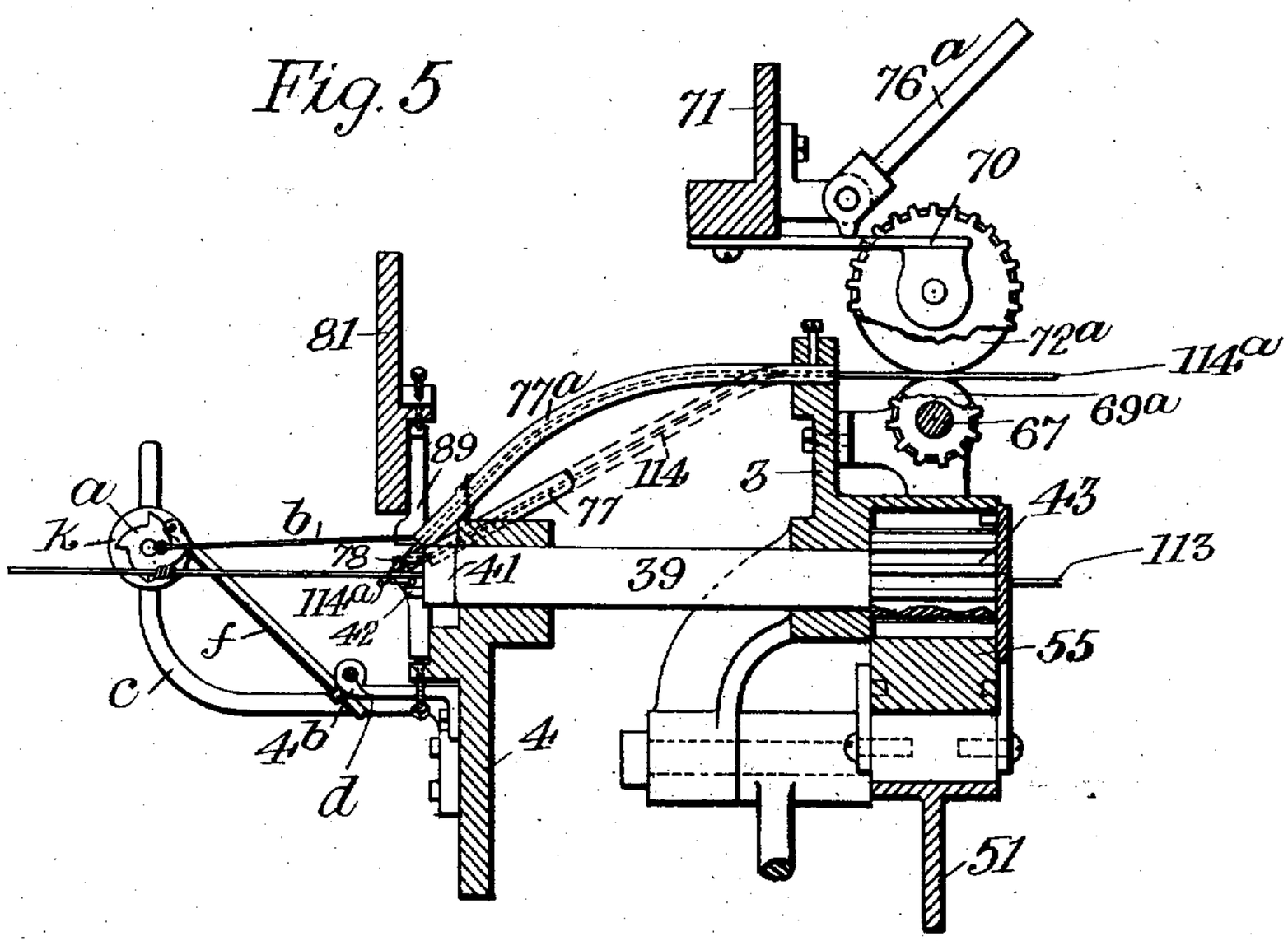


Fig. 6

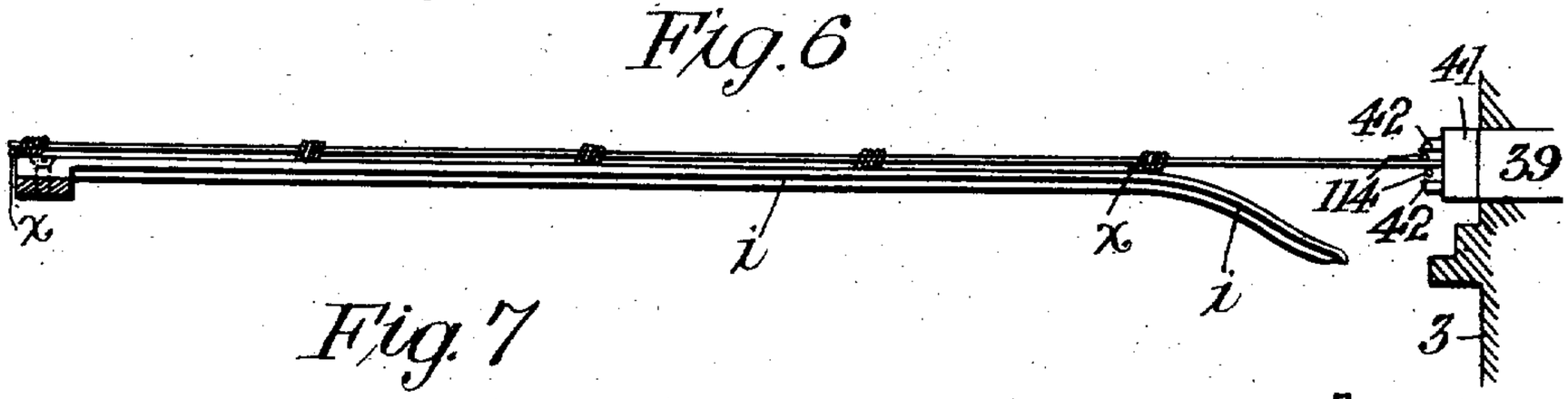


Fig. 7

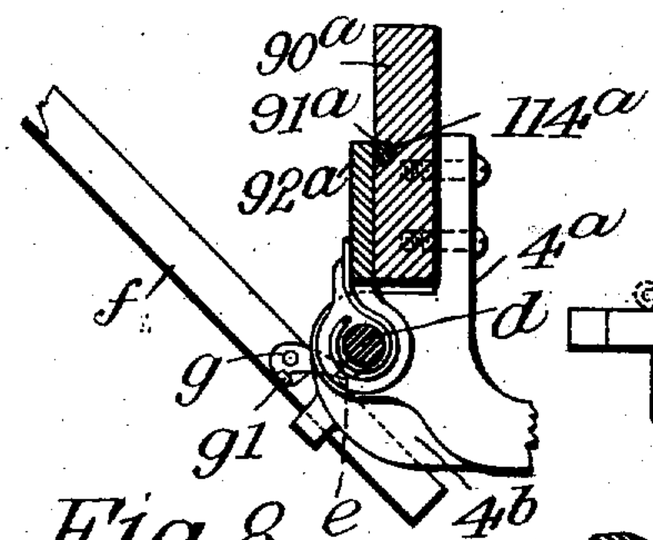


Fig. 8

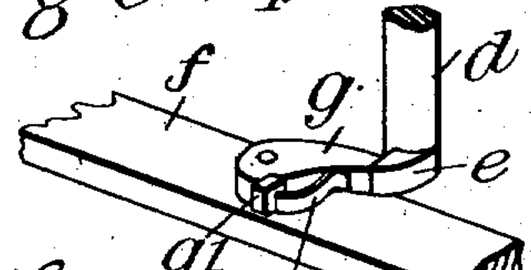
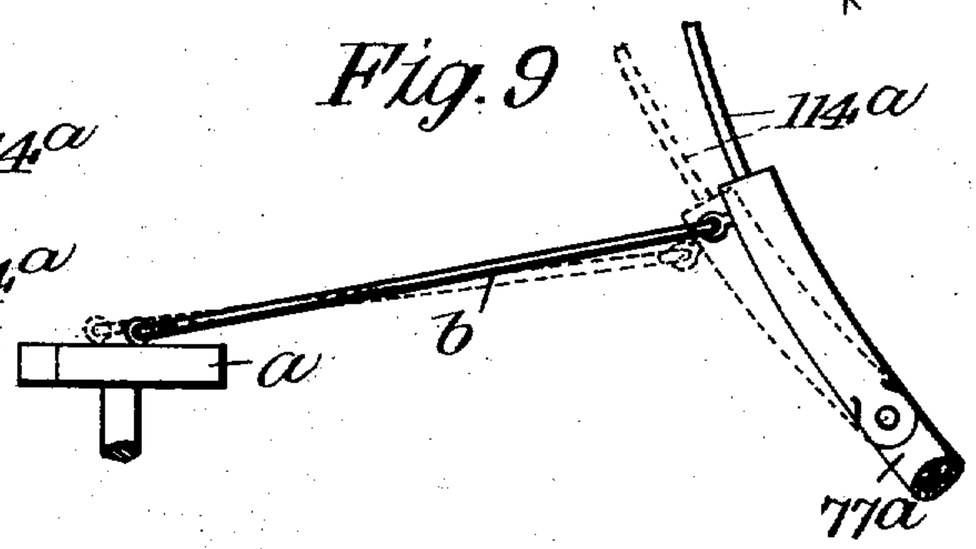


Fig. 9



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UNITED STATES PATENT OFFICE.

DATUS C. SMITH, OF BLANCHARD, NORTH DAKOTA.

WIRE-FENCE MACHINE.

989,199. Specification of Letters Patent. Patented Apr. 11, 1911.

Application filed October 30, 1908. Serial No. 460,260.

To all whom it may concern:

Be it known that I, DATUS C. SMITH, a citizen of the United States, residing at Blanchard, in the county of Traill and State of North Dakota, have invented certain new and useful Improvements in Wire-Fence Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The object of this invention is to provide means for applying flexible binding wires to wire fabric fencing in the course of its manufacture. Wire fencing made with said binding wires as a component part thereof, is disclosed and claimed as a new article of commerce in my United States Patent No. 905,942, granted Dec. 8, 1908. Such fencing is designed to be used in connection with supplementary barb-wires for completing the height of the fence when erected. The purpose of the binding wires or binders is to afford convenient and economical means for quickly uniting or tying together all the strand-wires of the fence; that is the fabric fencing composing the lower part and the barb-wires strung above, where such a combination is used.

The binders may consist practically of extensions or continuations of some of the stays or cross-wires that go to make up the fencing, or they may be independently attached. The fencing is preferably supplied in the usual form of rolls, with the binders folded therein with the fabric or otherwise arranged to avoid projection from the end of the roll, so as to make compact bundles for storage and shipment, leaving the binders to be bent up or extended above the fencing when unrolled and erected in the field. It is recommended that the binders be spaced at intervals of about four feet apart, which would be at every fourth stay where the stays are twelve inches apart, and every eighth stay where the stays are six inches apart.

The present invention relates more particularly to a fence-making machine in which the binder, while forming practically a continuation of the stay, is attached as a separate piece or section of wire, instead of being made as an integral prolongation of the stay.

In the accompanying drawings, which are to be taken as a part of this specification, a wire fence machine of the type exhibited in U. S. patent to A. J. Bates No. 577,639, dated February 23, 1897, is selected for illustrating the invention, which however may be applied to or embodied in many other types of machines, adapted for producing various styles of fencing, so that the invention in its broader aspects is not intended to be restricted to any particular construction or fence-making machine of any particular character. Only so much of said Bates machine is shown herein as needful for illustrating the present invention. Such parts of the drawings as correspond to the Bates machine are designated by the same reference symbols as used in the Bates patent.

Figure 1 is a left-hand side elevation, corresponding to Fig. 3 in the Bates patent drawings. Fig. 2 is a front elevation. Fig. 3 is a rear elevation. Fig. 4 is a detail view of one of the stay-wire guides, omitted from Fig. 3 for the sake of clearness. Fig. 5 is a horizontal section on line A—A of Fig. 3. Fig. 6 is a detail top plan view showing the finished fencing passing from the twisters or coilers, and showing longitudinal bars for pressing the hanging binders against the fencing to straighten them. Fig. 7 is an enlarged view, partly in horizontal section and partly in plan, showing the guide-holder for the binder-wire, its hinged face-plate, and devices for opening said face-plate to release the wire. Fig. 8 is a detail perspective of the said devices for opening the face-plate. Fig. 9 is a detail view of the delivery end of the guide-tube for the binder-wire and a portion of a connecting rod which controls the position of said delivery end. The full and dotted lines indicate opposite extreme positions.

Before explaining the present invention, it is well to view briefly the principle of the Bates patent, which is as follows: As the strand-wires are drawn intermittently through the machine, the stays are made by infeeding a plurality of stay-wires approximately in line with one another and crosswise of the strands, causing the several lengths or sections of said wires to span the respective spaces between the strands, severing such lengths or sections, and securing them to one another and to the strand-wires by twisting or coiling the adjacent and over-

lapping ends of contiguous sections upon the corresponding strands. Each stay is thus composed of a plurality of short wire lengths or sections connecting adjacent strands and practically continuous and in line with one another, making virtually a unitary though not integral stay.

According to the specific mechanism shown by Bates for carrying out the above principle, the fabric is manufactured with its width occupying a vertical plane. The strand-wires, designated 113 in the drawings, are drawn intermittently through a series of axially-bored coiler-shafts or twister-spindles 39, arranged horizontally one above another and journaled in the posts or uprights 3 and 4. These spindles are equipped at their receiving ends with pinions 43, and at their opposite ends with tips or twister-heads 41 having diametrically opposite coiling-pins or twisting-fingers 42. An exception, although not mentioned by Bates, may exist in the case of the top and bottom coilers or twisters. Since these operate on the marginal strands of the fencing, it would be sufficient to provide each with only one coiling pin. The pinions 43, which are in vertical line, are adapted to be engaged by and during one motion only of a reciprocatory rack 55; that is, on operative (upward) travel of the rack it is in mesh with the pinions, while on reverse (downward) movement it is thrown backward and out of mesh, during which time the pinions are also held locked. In this way the twister-spindles are simultaneously rotated in one direction only; which operation occurs of course during the interval of rest of the strand-wires.

The stay-wires 114 for supplying the stay sections, coming in the same direction as or parallel with the strands, are intermittently fed all together (at periods concurrent with the intermittent feeding of the strands) by a vertical series of coacting feed-rolls, one pair 69 and 72 for each wire. This series of feed-rolls 69 and 72 is arranged at one side of the series of twister-spindles. The rolls 69 are secured on an intermittently driven vertical shaft 67, while their coöperating rolls 72 are carried by spring arms 70 which are supported by an upright or post 71 and controlled by cam levers 76 for forcing the rolls 72 against the rolls 69 and for releasing the pressure at will to allow adjusting the wires. etc. Each pair of feed-rolls is provided with intermeshing gears 73 and 74 whereby positive rotation is imparted to the rolls 72 from the rolls 69.

The feed-rolls feed the stay-wires into a series of guide-tubes 77, one tube being arranged to receive the wire fed from each pair of rolls. These tubes are curved laterally toward the twister-spindles and also upwardly, each terminating a little below one of the twister-heads, so as to conduct the stay-wires upwardly across the faces of said twister-heads. As the stay-wires leave the tubes 77, they pass between stationary cutters 78 and movable cutters 89, the latter so arranged that when the movable cutter-bar 81 moves toward the fixed cutter-bar or post 4 (which movement occurs immediately after the infeed of the stay-wires), the cutters 89 will coöperate with the cutters 78 and sever the wires; the movement of the cutters 89 being on a downward curve owing to the peculiar coöperative connections with the cutter-bar 81. There is one pair of cutters a little below each coiler or twister-head, excepting the uppermost one which works on the top marginal strand and requires no cutter.

As will be observed, the series of feed-rolls 69, 72 and receiving ends of the guide-tubes 77 are located to the side of but lower than the corresponding series of coiler or twister-spindles. This is on account of the upward feeding of the stay-wires, each of which must be caused to span one of the spaces between the strands of the fencing. The difference in spacing and diameters of the feed-rolls, appearing in Fig. 2, is due to the different lengths of the several stay-wires that are required to be fed inward on account of the varied spacing between the strands, which spacing increases toward the top strand according to the customary construction of fabric fencing.

For guiding the several stay-wires across the respective spaces between the strands, guides 90 attached on the post 4 occupy positions between the coilers or twisters, except where the coilers are in such close proximity that the guides may be dispensed with. For the sake of clearness the guides are omitted from Fig. 3, but one is shown in detail in Fig. 4. These guides are made with open-faced grooves 91, preferably of a form corresponding with the curvature of the stay-wires, and closed by spring-pressed hinged face-plates 92. They have the further function of holding the short sections cut from the stay-wires 114 while the stay sections are being attached to the strands. After the stay-wires have been fed through the guides and severed and connected to the strand-wires, the next forward feeding of the fencing through the machine causes the several sections of the finished stay to bear against the yielding face-plates 92 and force them open to release the stay, after which the face-plates close upon the guides to receive the next feed of stay-wires.

In feeding in the stay-wires, their coil curvature is maintained and utilized, so that as the wires emerge from the tube 77 they pass up beyond the noses of the respective stationary cutters 78 between the strands and one coiling pin of the corresponding coilers

or twisters; thence upwardly in bowed or curved courses through the guides 90 and beyond the noses of the cutters 78 next above and to the opposite sides of the strands next above. The several lengths of the stay-wires thus fed upwardly are presented with their body portions bowed off from the cutter-bar or post 4 and with their end portions crossing or overlapping at the strands, their ends also inclining toward and against the faces of the tips or twister-heads 41 within range of the coiling-pins or twisting fingers 42. Each twister is thus adapted to operate upon the ends of two wire sections, one at each side of the strand; so that the rotation of the twisters (occurring after the operation of the movable cutters for severing the required lengths or sections of the stay-wires) will cause the pins 42 to engage the ends of such lengths or sections and jointly intercoil them with each other and around the strands. This joint action of the coilers or twisters causes all the meeting ends of the wire sections which span the spaces between the strand-wires to be connected together into practically a continuous and unitary stay. The bowed positions of the body portions of the stay-wires during the coiling of their ends brings them sufficiently off from the coilers so as not to be engaged by the coiling-pins.

For a full description of the Bates machine, including its driving mechanism, operating connections with the rack 55, feed-roll-drive shaft 67 and movable cutter-bar 81, and take-up mechanism for feeding and drum for reeling the finished product, etc., reference should be made to said Patent No. 577,639.

In connection with the foregoing description, the present invention, as embodied in the Bates machine, may be explained as follows: The flexible binders, supplied from an additional feed-wire designated 114ª in the drawings, are applied at spaced intervals, as for example four feet apart, which would be one at every fourth stay where the stays are twelve inches apart. The present description and drawings are based on this spacing of the stays. Means are provided for the infeeding of said binder-wire 114ª, cutting the same, and coiling or twisting one end about a strand of the fabric fencing, at spaced intervals just mentioned, during the time of the ordinary operations of the machine. Taking for example the largely used fabric fencing twenty-six inches high, there would need be for each binder an infeed of about twenty-eight inches of the binder-wire. Considering the purpose of the binders, they are preferably attached to the top marginal strand.

To incorporate the binder-wire feed with that of the stay-wires, as well as for economy of space and because of the better operation of smaller feed-rolls, it is preferred to feed the binder-wire, especially the longer lengths, from rolls that feed one-quarter of the amount (that is seven inches in this case) in four separate feeds, the cutting, coiling and releasing of the wire coming at the end of the fourth feed. This method is followed in the illustrated machine.

There are placed on the shaft 67 and upright 71 an extra set of feed-rolls, 69ª and 72ª, substantially similar in construction and operation to the other pairs of feed-rolls 69 and 72, except that the sizes are adapted to their special requirements. These rolls 69ª and 72ª are given such position in the vertical line of stay-wire feed-rolls as may be required to feed in the necessary length of binder-wire in four feeds, that is one-fourth of it in the time allotted for feeding in each set of stay sections. Said rolls 69ª, 72ª are interposed between such two pairs of the feed-rolls 69 and 72 as may be desired, or may in some cases be placed at the bottom of the line. In the drawings they are shown as the third set from the bottom. To find room for this extra set, the other sets of rolls 69, 72 are slightly spread in their positions, changing the curvature of the wire guides 77 somewhat in their inception, but maintaining their original curvature as they approach the coiling-pins 42 of the rotary coilers or twisters.

From the feed-rolls 69ª, 72ª the binder-wire 114ª is conducted through a guide-tube 77ª, similar to the other guide-tubes 77 except that its delivery end is adapted to be moved back and forth to bring the binder-wire under its knife at every fourth stroke. This is because the cutters act at each operation, while the binder-wire is fed only one-fourth the requisite amount per operation. Vibratory motion of the delivery end of the tube 77ª is effected by means of a ratchet-wheel *a* having a crank-pin with a connecting-rod *b* reaching to said delivery end of the tube, which is hinged to rock or vibrate on an axis transverse of the plane of the fabric. Said ratchet-wheel has four teeth and is actuated or turned one tooth at a time at each operation of the machine. It is mounted close beside the finished fabric and is successively actuated by the stays, one after another, as the fencing is intermittently drawn through the machine. That is, as the fabric moves rearward, the last made stay, or the preceding one, engages a tooth of the ratchet-wheel and turns it one-fourth, thereby moving the delivery end of the tube 77ª and affecting the position of the binder-wire 114ª, at one operation leaving said wire in position to be severed, and at the next three carrying it beyond the reach of the knife. As the to and fro motion of the delivery end of the guide-tube 77ª carries it also upward and down-

ward, a corresponding vibration is imparted to the forward end of the connecting-rod *b*, while a lateral vibration is given to its opposite end by revolution of the crank-pin. Hence the connecting-rod should have practically a universal pivotal connection with both the tube and ratchet-disk. This may be provided by the natural play of loose connections or by any suitable means.

The ratchet-wheel, it will be observed, is placed on the side of the finished fabric opposite that occupied by the finished binder *x*, so as not to engage the latter. In the illustrated structure, the axle of the ratchet-wheel is journaled in a bearing at the outer end of a fixed arm *c*, which may project rearward from the standard 4 and cross under the bottom strand of the fencing.

The knives used for severing the binder-wire are or may be one set or pair of the regular stay-wire cutters 78 and 89, between which the binder-wire is made to pass at the proper periods, or at every fourth operation as aforesaid, so that said cutters operate on both the stay-wire and the binder-wire at the same time. This set of cutters may, if desired, be made wider than the others for better accommodation of the two wires. The guide-tube 77ª directs the binder-wire, when it is to be cut, alongside of and preferably behind the wire that is to be cut with it, yet keeping the binder-wire beyond reach of the coiling-pin 42 at that point (Figs. 1 and 5).

Should it be found desirable for any reason not to cut the binder-wire with the same set of cutters used for a stay-wire, an independent set of cutters may be mounted in the cutter-bars 4 and 81 holding the series of cutters 78 and 89, the operations of all remaining the same as described.

As the unsevered binder-wire passes beyond the cutters, it enters a guide 90ª, shown supported by brackets 4ª attached to the standard 4, whereby said guide 90ª is held offset from the rear side of said standard, leaving space for the stay-wire guides 90 and sufficient clearance for release of the face-plates of the latter. Said guide 90ª is substantially similar to the guides 90, but longer by reason of the greater length of wire which it receives. Its open-faced groove 91ª has a curvature adapted to hold the binder-wire bowed off from the series of twisters or coilers, and is covered by a yielding or spring-pressed face-plate 92ª for confining the wire in said groove in substantially the same manner as the guides 90. Since the finished binder hangs from the top strand and has one loose end, the face-plate 92ª cannot, like the face-plate 92, be opened by pressure of the binder-wire when the fencing moves rearward. Owing to this, and the feeding of the binder-wire being in four parts, provision is made for positive opening of the face-plate 92ª to release the binder-wire when the operation thereon is completed. This is done by operative connections with the ratchet-wheel *a* already referred to. As the ratchet-wheel *a* and guide 90ª are on oppcsite sides of the fencing, such operative connections may be as follows: The face-plate 92ª is fixedly-secured on an upright shaft *d*, shown journaled in bearing-brackets 4ª affixed to the standard 4. The coil-spring which presses the face-plate 92ª against the guide 90ª is shown fitted on said shaft *d* between the brackets. Said shaft *d* extends below the bottom strand, passing through a bearing-bracket 4ᵇ, and has affixed on its lower end a lateral projection or toe *e* (Figs. 7 and 8). A rod *f*, operated from the ratchet-wheel *a*, passes loosely through a loop formed on the bracket 4ᵇ, and said rod carries a pivoted dog or trippet *g*, held against backward motion by a stop g^1 and adapted to yield in the opposite direction against a restraining spring g^2. Said rod *f* crosses under the bottom strand of the fencing, and is pivotally connected to a crank-wheel *k* fast upon the same shaft or axle as the ratchet-wheel *a*, so that by the intermittent turning of the ratchet-wheel the rod is reciprocated in four steps or motions. On forward movement, the dog or trippet *g* engages and trips the toe *e*, thereby turning the shaft *d* in a direction to swing open the face-plate 92ª and release the binder-wire. On reverse movement, the trippet yields and snaps past the toe. The foregoing provides for quick release of the binder-wire at the instant of the next feed of the fabric, since the last made stay, or a preceding one, is in engagement with one of the teeth of the ratchet-wheel, ready to turn it on the next feed; and to increase the range of movement of the rod *f*, thereby quickening the release, the crank-wheel *k* is or may be made larger than the ratchet-wheel *a*. The connection of the rod *f* to its crank-wheel is of course such that the trippet *g* will operate on the toe *e* on the movement of the rod occurring immediately after the attachment of the binder.

At every fourth feeding of the stay-wires 114, the binder-wire 114ª, having already been fed three-fourths, is fed the remaining one-fourth, carrying its forward or upper end alongside of and directly behind the upper end of the stay-wire that is about to be attached to the top strand of the fencing. These two wire ends come at the same side of the strand-wire, as shown in Figs. 1 and 3, and are engaged and carried around by the same coiling-pin 42 of the upper coiler or twister, which coils them jointly around the strand, simultaneously with the attachment of all the stay-wires to make the complete stay. During this operation (occurring during the interval of rest of the

strands) the ratchet-wheel *a* is in the position shown in Figs. 1 and 5, holding the tube 77ª in position to present the binder-wire 114ª between the cutters therefor, which cutters together with the other cutters of the series have just severed the stay-wires and the binder-wire immediately preceding the operation of the coilers or twisters. And the rod *f* is in the position shown in Figs. 7 and 8, with its trippet *g* about to trip toe *e* on the shaft *d*. The last made stay, or a preceding one, is about to engage a tooth of the ratchet-wheel, ready to turn it on the next feed.

On completion of the coiling or twisting operation, the stay and binder having thereby been finished, the next intermittent feed of the fencing takes place, so that the ratchet-wheel *a* is given a one-fourth turn, thereby immediately turning the shaft *d*, by coaction of the trippet *g* and toe *e*, so that the face-plate 92ª of the guide 90ª flies open, releasing the hanging binder. The loose end of the slightly curved wire will then naturally spring outward. During this same feed movement, the series of feed-rolls 69, 72 feed in the stay-wires 114 to supply the next stay, while the feed-rolls 69ª, 72ª feed in one-fourth the requisite length of the binder-wire 114ª, which is carried out of range of the knives by the same quarter turn of the ratchet-wheel *a*; so that on the next turn of the coilers or twisters, for marking a stay but not a binder, the partially infed length of the binder-wire will not be cut. The next three feed movements of the fencing, with stay-making operations occurring during the intervals of rest, cause the infeeding of the remaining three-fourths of the binder-wire, while the revolution of the ratchet-wheel *a* has carried the tube 77ª back and forward till finally the binder-wire is again in position to be severed by its cutters; and the trippet *g* has also been caused to snap back past the toe *e* and carried forward again in position to trip said toe and turn the shaft *d*, so that the binder-wire is ready for attachment at the fourth stay-making operation, and its guide 90ª is ready for releasing it on the fourth feed movement.

To straighten the binders, longitudinal strips or bars *i* may be supported close beside the finished fabric, at the same side on which the binders hang (Figs. 1 and 6), the front portions of said strips being bent or curved at such an angle as to arrest the binders before they advance ahead of the stay last made. These strips or bars, by holding the binders against the fabric, will tend to drift the binders back against the coils or connections of the succeeding stay, and these coils or connections will brush the binders onward. The binders *x* may now be allowed to hang free and wind up with the finished product.

It should be added that the crimping mechanism shown in the Bates patent, which crimps the strands of the finished fencing at right angles to the plane of the fabric, would not be desirable in connection with the present invention. It would be preferable to employ crimping devices which crimp the strands in the plane of the fabric, since such devices, by reason of their vertical action, will not engage the hanging binders. As such crimping mechanisms are well known in the art, and form no part of the present invention, they are not disclosed herein.

The foregoing description is based, by way of example, on the manufacture of fabric fencing having its stays spaced at intervals of twelve inches. Should the stays be spaced six inches apart, then, in order to maintain the same spacing of four feet between the binders, the infeeding of the binder-wire 114ª would be accomplished in eight operations instead of four, thus changing the size of the feed-rolls 69ª and 72ª and changing the four-tooth ratchet-wheel to a similar one of eight teeth. From which it will be seen that the proportional feed of the binder-wire per operation will depend upon the capacity of the feed-rolls, and that the ratchet-wheel should have the same number of teeth as the number of fractional infeeds required for one full feed of the binder-wire.

If a higher fencing than that suggested is made, the binders would be proportionally shorter. For the higher heights of fencing, because of the shorter binders and consequent shorter infeed of the binder-wire required, it would probably be preferable to employ larger feed-rolls, where there is room for them, higher up in the series, and to resort to a partial cutting away of the periphery of the feed-rolls 72ª as shown in Fig. 19 of the Bates patent drawings. This would give, for example, one-quarter feeds for either twelve-inch or six-inch spacing of the stays. For the former spacing, the periphery of the roll 72ª would be cut away three-fourths, and for the latter spacing would be cut away seven-eighths. The rolls 69ª and 72ª would in either case feed one-fourth the amount of the binder-wire at every alternate rotation of the feed-rolls, requiring eight operations for a complete feed. These figures are based on the assumption that the roll 72ª is twice the diameter of the roll 69ª, and makes a half revolution per operation, according to the proportions specified in the Bates patent.

The binder-wire of course may be fed at one stroke wherever such feeding is practicable. This stroke would then occur once in four operations, which would be accomplished by means of suitable pitman connection between the ratchet-wheel *a* and the lever 76ª controlling the feeding of the binder-wire. In such case the lever 76ª would at

every fourth operation be moved in a direction to force the feed-roll 72ª in contact with the binder-wire, and during the other three operations would release said roll from the wire.

It will be obvious that the broad principles and a number of the more specific features of this invention are applicable to other machines than that of the Bates Patent No. 577,639, as, for instance, the feeding of the binder-wire in fractional feeds, cutting it with the same general mechanism that is used for cutting the stay-wire, and especially coiling or twisting the binder-wire with the same coil or twister (whether one pin or two pins be used) that is used in coiling or twisting the stay around the top strand-wire. When an integral stay is applied across the entire width of the fencing, such stay is generally fastened to the marginal strands by means of a coiling-pin, and fastened to the intermediate strands by means of clamps or locks or by coiling or twisting intermediate portions of the stay-wire upon said strands. In such case, the binder-wire would be very suitably applied by mechanism embodying the same principles herein set forth.

An alternative arrangement for applying the binders which may be desirable in the case of the higher fencing requiring correspondingly shorter binders, will now be mentioned. According to this arrangement, instead of feeding the binder-wire up from a relatively low point in the series of feed-rolls and guide-tubes, the outlet end of the guide-tube 77ª may be arranged to deliver the binder-wire 114ª a little below the top strand of the fencing, and project it above said strand for the distance required for a binder; the wire passing through a suitable guide or wire-holding means adapted to be released similarly to the guide 90ª heretofore mentioned. While in this the binder-wire may be fed through at a single stroke, still the feed is preferably made one-quarter of a stroke at a time, as already stated. The delivery end of the tube 77ª would then be moved to and fro substantially as and by the same means hereinbefore described, keeping the binder-wire out of reach of its cutters and also out of reach of its coiling-pin of the uppermost coiler or twister except at every fourth operation, at which time the wire would be moved into position for engagement by said devices and would be severed and coiled around the strand jointly with the end of the stay, by the opposite coiling-pin, from that which acts on the stay-wire. After the operation, the finished binder-wire standing above the top of the fencing may then be turned down across the fabric by any suitable means, as for example by a lever operated by the rising and falling knife-bar 81. It will be seen that this method is an adaptation of the arrangement already described, the difference being that the binder-wire is fed at a higher point so as to project above the fencing, and the lower severed end of said wire, instead of its forward end, is tied to the top strand by the coiling-pin.

I claim as my invention and desire to secure by Letters Patent of the United States:

1. A wire-fence machine including means, in combination with fabric-making mechanism, for supplying at intervals an additional length of wire and means for connecting it to the fabric as a freely-extending binder projecting or adapted to be projected beyond a margin of the fabric.

2. A wire-fence machine having, in combination, fabric-making mechanism and periodically-operating binder-applying mechanism for attaching freely-extending binder-wires at intervals to a marginal portion of the fabric, and means for feeding a supply of wire to said binder-applying mechanism.

3. A wire-fence machine having, in combination, periodically-acting stay-applying and binder-applying mechanisms, the latter operating at intervals of time which are multiples of the time-intervals of the former, the binders being in addition to the stays which tie the strand-wires together.

4. A wire-fence machine having, in combination, periodically-operating stay-applying mechanism, and means for furnishing extra wire and making therefrom stay-prolongations beyond a marginal strand, at intervals.

5. A wire-fence machine including means for presenting the end of a free binder-wire adjacent to the end of a stay-wire, and a wire-connecting instrumentality operative on the said ends of the two wires to secure them jointly upon the same strand.

6. A wire-fence machine including a rotary twister or coiler having a coiling-pin, and means for presenting side by side the ends of a stay-wire and binder-wire for engagement by said coiling-pin, the latter adapted and operative to coil both ends together upon the same strand.

7. A wire-fence machine having, in combination, periodically-operating stay-making mechanism, including means for supplying thereto wire for the stay, and means operating at greater intervals of time for supplying to said mechanism a binder-wire in conjunction with the stay-wire supplied at such intervals, said mechanism operative to apply both the stay-wire and the binder-wire to the fabric.

8. A wire-fence machine including a wire-connecting instrumentality operative to connect a stay to a strand, means for periodically supplying a stay-wire thereto, and means operating at greater intervals for presenting a binder-wire thereto, said in-

strumentality operative to connect both wires to the same strand.

9. A wire-fence machine including a rotary twister or coiler having a coiling-pin, means for intermittently presenting thereto the end of a stay-wire, and means intermittently-operating at greater intervals of time for presenting thereto the end of a binder-wire, said coiling-pin adapted and operative to coil or twist both ends jointly upon the same strand.

10. A wire-fence machine having, in combination, periodically-operating stay-wire and binder-wire feeding mechanisms, stay-applying mechanism operating after each stay-wire feed, and binder-applying mechanism operating after a determined number or plurality of binder-wire feeds.

11. A wire-fence machine including, in combination, with fabric-making mechanism, means operative to feed a fractional amount of wire for a binder per operation or determined number of operations of the loom, and binder-attaching means periodically-operative after such number of partial feeds of said wire as supply the full length for a binder.

12. A wire-fence machine having, in combination, successively-operating stay-applying mechanism, and step-by-step binder-wire-feeding mechanism, and binder applying mechanism operating at time-intervals greater than those of the stay-applying mechanism.

13. A wire-fence machine having, in combination, intermittently-operating mechanism for feeding simultaneously a stay-wire and binder-wire, and wire-connecting mechanism operating after each feed-operation to attach the stay and operating at greater intervals to attach the binder.

14. A wire-fence machine having, in combination, stay-applying mechanism including a coiler or twister operating on a marginal strand, and means for feeding a binder-wire at intervals and presenting its end to the action of said coiler or twister.

15. A wire-fence machine having, in combination, stay-applying mechanism including a coiler or twister operating on a marginal strand, means for supplying per operation a full length of wire for a stay, means for feeding per operation a partial length of wire for a binder, a cutter operative to sever the binder-wire after a determined number of feeds thereof, and means operating at the same time-intervals as the cutter for presenting an end of said binder-wire to the action of said coiler or twister.

16. A wire-fence machine having, in combination, stay-applying mechanism including a marginal coiler or twister, and binder-wire feed-rolls working once per operation but located at such distance from said coiler or twister that the end of the binder-wire is carried thereto by a plurality of operations or a step-by-step feed.

17. In a wire-fence machine, adapted to make a stay composed of a plurality of short sections connecting the strands, the combination of a series of simultaneously-operating pairs of feed-rolls for feeding such wire sections per operation, said series including a pair of rolls for feeding a binder-wire, and means operative to attach said binder-wire to one of the strands after a determined number of feeds.

18. A wire-fence machine having, in combination, fabric-making mechanism adapted to connect the strands together by a plurality of short stay-sections, an intermittently-operating series of feed-mechanisms for feeding simultaneously a number of stay-wires to supply such sections, said series including one for feeding a binder-wire, means operative for attaching said stay-wires after each feed and for attaching said binder-wire after a determined number of feeds, and a periodically-operating series of cutters for severing said stay-wires, including one operative to sever the binder-wire after the aforesaid predetermined number of feeds.

19. In a wire-fence machine, the combination with twisters or coilers, of stay-wire feed-rolls and binder-wire feed-rolls, and means for guiding the two wires fed therefrom to the same twister or coiler.

20. In a wire-fence machine, the combination with twisters or coilers, of stay-wire feed-rolls and feed-rolls for feeding binder-wire, said binder-wire being in addition to the stays and strands, means for guiding the two wires fed therefrom to the same twister or coiler, and a knife adapted to operate on both wires.

21. In a wire-fence machine, the combination with a series of twisters, of means for feeding and simultaneously presenting the ends of two wires to the action of a marginal twister, the arrangement being such that the one wire reaches the marginal twister at each operation, while the other reaches said marginal twister together with the first wire at longer intervals or at every determined number of operations.

22. In a wire-fence machine, the combination with a twister or coiler, of means for feeding and simultaneously presenting the ends of the two wires to the action of said twister, the arrangement being such that the one wire reaches the twister at each operation, while the other reaches the twister together with the first wire at longer intervals or at every determined number of operations, and a cutter or cutters adapted to operate on one or both wires at each operation, and means automatically holding out of reach of the cutter, and moving it into reach at the aforesaid intervals, the wire

which reaches the twister the less number of times.

23. A wire-fence machine having, in combination, stay-applying mechanism, stay-wire feeding mechanism, step-by-step binder-wire feeding mechanism, cutting-mechanism operative to sever the stay-wires at each operation and to sever the binding-wire at greater intervals, and means for applying the binder at corresponding intervals.

24. A wire-fence machine including, in combination with fabric-making mechanism, means for feeding a binder-wire and attaching it to the fabric at determined periods, a periodically-acting cutter, a guide-tube for said binder-wire, and automatic means so controlling said guide-tube as to move the wire into reach of said cutter only at periods corresponding in time to the periods of attachment of the binder-wire.

25. A wire-fence machine including, in combination with fabric-making mechanism, means for feeding a binder-wire, severing and attaching it to the fabric at intervals, a guide which holds the severed binder-wire during the attaching operation, and means for automatically releasing said wire from said guide on completion of said operation.

26. A wire-fence machine having, in combination, means for applying stays at intervals to a series of strands, and applying binders at greater intervals which are multiples of the former intervals, binder-wire feeding mechanism, and means for automatically controlling operation on the binder-wire including a ratchet-wheel mounted beside the finished fabric and adapted to be turned successively by the advancing stays as the fencing is moved through the machine.

27. A wire-fence machine having, in combination, periodically-operating stay-applying mechanism, means for feeding a binder-wire step-by-step, or a partial feed for each stay-applying operation, and severing and applying said wire to a strand when the full length is fed, and automatic means controlling operation on said binder-wire including a ratchet-wheel having the same number of teeth as the number of partial feeds, said ratchet-wheel mounted beside the finished fabric and successively actuated one tooth at a time by the stays, one after another, of the moving fabric.

28. In combination with means for applying binder-wires at intervals to a fencing, so that the wires lie upon the fabric, longitudinally arranged bars or strips in contact with the fabric adapted to press the loose binders thereagainst so as to lodge each binder against the connections of the adjacent stay.

29. In a wire-fence machine, the combination with fabric-making mechanism, of means for feeding a binder-wire, means for severing the binder-wire, a movable guide-tube for the binder-wire, a ratchet-wheel operably connected to said guide-tube and actuated by the onward movement of the finished fabric whereby the guide-tube is moved to present the binder-wire to said severing means when the fabric moves a determined distance, and means for attaching the binder to the fabric.

30. In a wire-fence machine, the combination with fabric making mechanism, of means for attaching a binder to the fabric, a guide for holding the binder during the attaching operation, a movable face-plate for said guide, a ratchet-wheel operated by the onward movement of the finished fabric, and means connecting said ratchet-wheel and face-plate whereby the latter is moved to release the binder as the fabric moves onward after the attachment of the binder thereto.

31. In a wire-fence machine, the combination with fabric making mechanism, of means for attaching a binder to the fabric, a guide for holding the binder during the attaching operation, a hinged face-plate for the guide, and means for swinging said face-plate away from the guide to release the binder after its attachment to the fabric, said means comprising a ratchet-wheel operated by the onward movement of the finished fabric and a rod reciprocated by the ratchet-wheel and adapted to swing the face-plate open to release the binder.

32. In a wire-fence machine, the combination with fabric-making mechanism, of means for attaching a binder to the fabric, a guide for holding the binder during the attaching operation, a hinged face-plate for the guide, said face-plate having a toe, a ratchet wheel adapted to be operated by the onward movement of the finished fabric, a disk rotated by said ratchet-wheel, a reciprocatory rod pivoted to said disk and provided with a trippet adapted to engage said toe and swing the face-plate open to release the binder after its attachment to the fabric, and means for closing the face-plate.

In testimony whereof I affix my signature, in presence of two witnesses.

DATUS C. SMITH.

Witnesses:
C. E. HERTZ,
HELEN HOUSTON.